$f_0(1500)$

was $f_0(1525)$ and $f_0(1590)$

$I^G(J^{PC}) = 0^+(0^{++})$

See also the mini-reviews on scalar mesons under $f_0(1370)$ and on non-$q\overline{q}$ candidates. (See the index for the page number.)

$f_0(1500)$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1505± 9 OUR AVERAGE					
1515±20		ABELE	96B	CBAR	0.0 $\overline{p}p \to \pi^0 K^0_L K^0_L$
1500±15		[1] AMSLER	95B	CBAR	0.0 $\overline{p}p \to 3\pi^0$
1505±15		[2] AMSLER	95C	CBAR	0.0 $\overline{p}p \to \eta\eta\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 1505		ABELE	96	CBAR	0.0 $\overline{p}p \to 5\pi^0$
1500± 8		[3] ABELE	96C	RVUE	
1460±20	120	[4] AMELIN	96B	VES	37 $\pi^- A \to \eta\eta\pi^- A$
1500± 8		BUGG	96	RVUE	
1500±10		[5] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
1445± 5		[6] ANTINORI	95	OMEG	300,450 $pp \to pp2(\pi^+\pi^-)$
1497±30		[4] ANTINORI	95	OMEG	300,450 $pp \to pp\pi^+\pi^-$
~ 1505		BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$
1446± 5		[4] ABATZIS	94	OMEG	450 $pp \to pp2(\pi^+\pi^-)$
1545±25		[4] AMSLER	94E	CBAR	0.0 $\overline{p}p \to \pi^0\eta\eta'$
1520±25		[7,8] ANISOVICH	94	CBAR	0.0 $\overline{p}p \to 3\pi^0, \pi^0\eta\eta$
1505±20		[8,9] BUGG	94	RVUE	$\overline{p}p \to 3\pi^0$, $\eta\eta\pi^0$, $\eta\pi^0\pi^0$
1560±25		[4] AMSLER	92	CBAR	0.0 $\overline{p}p \to \pi^0\eta\eta$
1550±45±30		[4] BELADIDZE	92C	VES	36 $\pi^-\mathrm{Be} \to \pi^-\eta'\eta\mathrm{Be}$
1449± 4		[4] ARMSTRONG	89E	OMEG	300 $pp \to pp2(\pi^+\pi^-)$
1610±20		[4] ALDE	88	GAM4	300 $\pi^- N \to \pi^- N 2\eta$
~ 1525		ASTON	88D	LASS	11 $K^- p \to K^0_S K^0_S \Lambda$
1570±20	600	[4] ALDE	87	GAM4	100 $\pi^- p \to 4\pi^0 n$
1575±45		[10] ALDE	86D	GAM4	100 $\pi^- p \to 2\eta n$
1568±33		[4] BINON	84C	GAM2	38 $\pi^- p \to \eta\eta' n$
1592±25		[4] BINON	83	GAM2	38 $\pi^- p \to 2\eta n$
1525± 5		[4] GRAY	83	DBC	0.0 $\overline{p}N \to 3\pi$

[1] T-matrix pole, supersedes ANISOVICH 94.
[2] T-matrix pole, supersedes ANISOVICH 94 and AMSLER 92.
[3] T-matrix pole.

[4] Breit-Wigner mass.
[5] T-matrix pole. Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.
[6] Supersedes ABATZIS 94, ARMSTRONG 89E. Breit-Wigner mass.
[7] From a simultaneous analysis of the annihilations $\overline{p}p \rightarrow 3\pi^0, \pi^0\eta\eta$.
[8] T-matrix pole.
[9] Reanalysis of ANISOVICH 94 data.
[10] From central value and spread of two solutions. Breit-Wigner mass.

f_0(1500) WIDTH

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
111±12 OUR AVERAGE					
105±15		ABELE	96B	CBAR	0.0 $\overline{p}p \rightarrow \pi^0 K^0_L K^0_L$
120±25		[11] AMSLER	95B	CBAR	0.0 $\overline{p}p \rightarrow 3\pi^0$
120±30		[12] AMSLER	95C	CBAR	0.0 $\overline{p}p \rightarrow \eta\eta\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
∼ 169		ABELE	96	CBAR	0.0 $\overline{p}p \rightarrow 5\pi^0$
100±30	120	[13] AMELIN	96B	VES	37 $\pi^- A \rightarrow \eta\eta\pi^- A$
132±15		BUGG	96	RVUE	
154±30		[14] AMSLER	95D	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
65±10		[15] ANTINORI	95	OMEG	300,450 $pp \rightarrow pp2(\pi^+\pi^-)$
199±30		[13] ANTINORI	95	OMEG	300,450 $pp \rightarrow pp\pi^+\pi^-$
56±12		[13] ABATZIS	94	OMEG	450 $pp \rightarrow pp2(\pi^+\pi^-)$
100±40		[13] AMSLER	94E	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\eta\eta'$
148^{+20}_{-25}		[16,17] ANISOVICH	94	CBAR	0.0 $\overline{p}p \rightarrow 3\pi^0, \pi^0\eta\eta$
150±20		[17,18] BUGG	94	RVUE	$\overline{p}p \rightarrow 3\pi^0$, $\eta\eta\pi^0$, $\eta\pi^0\pi^0$
245±50		[13] AMSLER	92	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\eta\eta$
153±67±50		[13] BELADIDZE	92C	VES	36 π^- Be $\rightarrow \pi^-\eta'\eta$Be
78±18		[13] ARMSTRONG	89E	OMEG	300 $pp \rightarrow pp2(\pi^+\pi^-)$
170±40		[13] ALDE	88	GAM4	300 $\pi^- N \rightarrow \pi^- N 2\eta$
150±20	600	[13] ALDE	87	GAM4	100 $\pi^- p \rightarrow 4\pi^0 n$
265±65		[19] ALDE	86D	GAM4	100 $\pi^- p \rightarrow 2\eta n$
260±60		[13] BINON	84C	GAM2	38 $\pi^- p \rightarrow \eta\eta' n$
210±40		[13] BINON	83	GAM2	38 $\pi^- p \rightarrow 2\eta n$
101±13		[13] GRAY	83	DBC	0.0 $\overline{p}N \rightarrow 3\pi$

[11] T-matrix pole, supersedes ANISOVICH 94.
[12] T-matrix pole, supersedes ANISOVICH 94 and AMSLER 92.
[13] Breit-Wigner mass.
[14] T-matrix pole. Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.
[15] Supersedes ABATZIS 94, ARMSTRONG 89E. Breit-Wigner mass.
[16] From a simultaneous analysis of the annihilations $\overline{p}p \rightarrow 3\pi^0, \pi^0\eta\eta$.
[17] T-matrix pole.
[18] Reanalysis of ANISOVICH 94 data.
[19] From central value and spread of two solutions. Breit-Wigner mass.

$f_0(1500)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\eta\eta'(958)$	seen
Γ_2	$\eta\eta$	seen
Γ_3	4π	
Γ_4	$4\pi^0$	seen
Γ_5	2π	
Γ_6	$2\pi^0$	seen
Γ_7	$2\pi^+ 2\pi^-$	seen
Γ_8	$K\overline{K}$	seen

$f_0(1500)$ BRANCHING RATIOS

$\Gamma(\eta\eta'(958))/\Gamma(\eta\eta)$ — Γ_1/Γ_2

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.84 ± 0.23	ABELE	96C	RVUE	
0.29 ± 0.10	[20] AMSLER	95C	CBAR	$0.0\ \overline{p}p \rightarrow \eta\eta\pi^0$
$2.7\ \pm0.8$	BINON	84C	GAM2	$38\ \pi^- p \rightarrow \eta\eta' n$

[20] Using AMSLER 94E ($\eta\eta'\pi^0$).

$\Gamma(\eta\eta)/\Gamma_{total}$ — Γ_2/Γ

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
large	ALDE	88	GAM4	$300\ \pi^- N \rightarrow \eta\eta\pi^- N$
large	BINON	83	GAM2	$38\ \pi^- p \rightarrow 2\eta n$

$\Gamma(4\pi^0)/\Gamma(\eta\eta)$ — Γ_4/Γ_2

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.8 ± 0.3	ALDE	87	GAM4	$100\ \pi^- p \rightarrow 4\pi^0 n$

$\Gamma(2\pi^0)/\Gamma(\eta\eta)$ — Γ_6/Γ_2

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.29 ± 0.72	ABELE	96C	RVUE	
1.45 ± 0.61	[21] AMSLER	95C	CBAR	$0.0\ \overline{p}p \rightarrow \eta\eta\pi^0$
2.12 ± 0.81	[22] AMSLER	95D	CBAR	$0.0\ \overline{p}p \rightarrow \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$
<0.3	[23] BINON	83	GAM2	$38\ \pi^- p \rightarrow 2\eta n$

[21] Using AMSLER 95B ($3\pi^0$).
[22] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.
[23] Superseded by PROKOSHKIN 90.

$\Gamma(K\overline{K})/\Gamma(\eta\eta)$ — Γ_8/Γ_2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.6		[24] BINON	83	GAM2	38 $\pi^- p \rightarrow 2\eta n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.4	90	[25] PROKOSHKIN	91	GAM4	300 $\pi^- p \rightarrow \pi^- p \eta\eta$

[24] Using ETKIN 82B and COHEN 80.
[25] Combining results of GAM4 with those of WA76 on $K\overline{K}$ central production.

$\Gamma(K\overline{K})/\Gamma_{\text{total}}$ — Γ_8/Γ

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.044 ± 0.021	BUGG	96	RVUE

$\Gamma(K\overline{K})/\Gamma(2\pi)$ — Γ_8/Γ_5

VALUE	DOCUMENT ID		TECN	COMMENT
0.20 ± 0.08	[26] ABELE	96B	CBAR	0.0 $\overline{p}p \rightarrow \pi^0 K^0_L K^0_L$

[26] Using AMSLER 95B ($3\pi^0$) and AMSLER 94C ($2\pi^0\eta$).

$\Gamma(2\pi)/\Gamma_{\text{total}}$ — Γ_5/Γ

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.454 ± 0.104	BUGG	96	RVUE

$\Gamma(4\pi)/\Gamma(2\pi)$ — Γ_3/Γ_5

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.4 ± 0.8	[27] ABELE	96	CBAR	0.0 $\overline{p}p \rightarrow 5\pi^0$

[27] Excluding $\rho\rho$ contribution to 4π.

$f_0(1500)$ REFERENCES

ABELE	96	PL B380 453	+Adomeit, Amsler+	(Crystal Barrel Collab.)
ABELE	96B	PL B385 425	+Adomeit, Amsler+	(Crystal Barrel Collab.)
ABELE	96C	NP A609 562		
AMELIN	96B	YAF 59 1021	+Berdnikov, Bityukov+	(SERP, TBIL)
BUGG	96	NP B471 59	+Sarantsev, Zou	(LOQM, PNPI)
AMSLER	95B	PL B342 433	+Armstrong, Brose+	(Crystal Barrel Collab.)
AMSLER	95C	PL B353 571	+Armstrong, Hackman+	(Crystal Barrel Collab.)
AMSLER	95D	PL B355 425	+Armstrong, Spanier+	(Crystal Barrel Collab.)
ANTINORI	95	PL B353 589	+Barberis, Bayes+	(ATHU, BARI, BIRM, CERN, JINR)
BUGG	95	PL B353 378	+Scott, Zoli+	(LOQM, PNPI, WASH)
ABATZIS	94	PL B324 509	+Antinori, Barberis+	(ATHU, BARI, BIRM, CERN, JINR)
AMSLER	94C	PL B327 425	+Armstrong, Ravndal+	(Crystal Barrel Collab.)
AMSLER	94D	PL B333 277	+Anisovich, Spanier+	(Crystal Barrel Collab.)
AMSLER	94E	PL B340 259	+Armstrong, Hackman+	(Crystal Barrel Collab.)
ANISOVICH	94	PL B323 233	+Armstrong+	(Crystal Barrel Collab.)
BUGG	94	PR D50 4412	+Anisovich+	(LOQM)
AMSLER	92	PL B291 347	+Augustin, Baker+	(Crystal Barrel Collab.)
BELADIDZE	92C	SJNP 55 1535	+Bityukov, Borisov	(SERP, TBIL)
		Translated from YAF 55 2748.		
PROKOSHKIN	91	SPD 36 155		(GAM2, GAM4 Collab.)
		Translated from DANS 316 900.		

PROKOSHKIN	90	Hadron 89 Conf. p 27		(SERP, BELG, LANL, LAPP, PISA, KEK)
ARMSTRONG	89E	PL B228 536	+Benayoun	(ATHU, BARI, BIRM, CERN, CDEF, CURIN+)
ALDE	88	PL B201 160	+Bellazzini, Binon+	(SERP, BELG, LANL, LAPP, PISA)
ASTON	88D	NP B301 525	+Awaji, Bienz+	(SLAC, NAGO, CINC, INUS)
ALDE	87	PL B198 286	+Binon, Bricman+	(LANL, BRUX, SERP, LAPP)
ALDE	86D	NP B269 485	+Binon, Bricman+	(BELG, LAPP, SERP, CERN, LANL)
BINON	84C	NC 80A 363	+Bricman, Donskov+	(BELG, LAPP, SERP, CERN)
BINON	83	NC 78A 313	+Donskov, Duteil+	(BELG, LAPP, SERP, CERN)
Also	83B	SJNP 38 561	Binon, Gouanere+	(BELG, LAPP, SERP, CERN)
		Translated from YAF 38 934.		
GRAY	83	PR D27 307	+Kalogeropoulos, Nandy, Roy, Zenone	(SYRA)
ETKIN	82B	PR D25 1786	+Foley, Lai+	(BNL, CUNY, TUFTS, VAND)
COHEN	80	PR D22 2595	+Ayres, Diebold, Kramer, Pawlicki+	(ANL)

OTHER RELATED PAPERS

ANISOVICH	97	PL B395 123	+Anisovich, Sarantsev	(PNPI)
PROKOSHKIN	97	SPD 42 117	+Kondashov, Sadovsky	(SERP)
		Translated from DANS 353 323.		
AMSLER	96	PR D53 295	+Close	(ZURI, RAL)
AMSLER	95E	PL B353 385	+Close	(ZURI, RAL)
GASPERO	95	NP A588 861		(ROMA)
SLAUGHTER	88	MPL A3 1361		(LANL)